

AMENDMENTS TO THE CLAIMS

Following is a complete set of claims as amended with this Response. This complete set of claims excludes cancelled claim 1 and includes amended claims 2-5, 8, 10, 17-19, and 22 and new claims 23-32.

1. (Cancelled)

2. (Currently Amended) The method of claim [[1]] 5 wherein the step of monitoring blood pressure is performed to monitor diastolic pressure.

3. (Currently Amended) The method of claim [[1]] 5 wherein the step of monitoring blood pressure is performed using an implantable pressure sensor.

4. (Currently Amended) The method of claim 1 A method for detecting non-obstructive apnea within a patient using an implantable medical system, the method comprising the steps of:

monitoring diastolic blood pressure; and
detecting non-obstructive apnea within the patient based on changes in diastolic blood pressure;

wherein the step of detecting non-obstructive apnea within the patient based on changes in diastolic blood pressure includes the steps of:

tracking changes in diastolic blood pressure from beat to beat;
identifying a period of time having a substantially uniform decrease in diastolic blood pressure from beat to beat; and
associating non-obstructive apnea with the period of time having the substantially uniform decrease in the diastolic blood pressure from beat to beat.

5. (Currently Amended) The method of claim 1 A method for detecting non-obstructive apnea within a patient using an implantable medical system, the method comprising the steps of:

monitoring blood pressure; and
detecting non-obstructive apnea within the patient based on changes in blood pressure;

wherein the step of detecting non-obstructive apnea within the patient based on changes in blood pressure includes the steps of:

evaluating BP(n) wherein BP(n) is the blood pressure of a heartbeat "n" for a plurality of beats;

calculating $\Delta\text{BP}(n) = \text{BP}(n) - \text{BP}(n-1)$ for the plurality of beats;
calculating $\Delta\Delta\text{BP} = \Delta\text{BP}(n) - \Delta\text{BP}(n-1)$ for the plurality of beats; and

identifying a period of time wherein $\Delta\text{BP}(n) < 0$ and $|\Delta\Delta\text{BP}|$ is less than a predetermined rate-based threshold value; and

determining whether the period of time exceeds a predetermined time-based threshold value and, if so, generating a signal indicative of the onset of non-obstructive apnea.

6. (Original) The method of claim 5 wherein the time-based threshold value is in the range of ten to fifteen seconds.

7. (Original) The method of claim 5 wherein the time-based threshold value is ten seconds.

8. (Currently Amended) The method of claim 1 further including the step of A method for detecting non-obstructive apnea within a patient using an implantable medical system, the method comprising the steps of:

monitoring blood pressure;
detecting non-obstructive apnea within the patient based on changes in blood pressure; and

detecting patient motion of the type associated with respiration and wherein the step of detecting non-obstructive apnea based on changes in blood pressure is performed only if there is substantially no motion of the type associated with respiration.

9. (Original) The method of claim 8 wherein the system includes an accelerometer and wherein the patient motion is detected using the accelerometer.

10. (Currently Amended) The method of claim [[1]] 5 further including the step of delivering apnea therapy in response to the detection of non-obstructive apnea.

11. (Original) The method of claim 10 wherein the step of delivering apnea therapy includes the step of delivering overdrive pacing therapy to the heart of the patient.

12. (Original) The method of claim 11 wherein the overdrive pacing therapy is dynamic atrial overdrive (DAO) pacing therapy.

13. (Original) The method of claim 10 for use with a system having an implantable drug pump and wherein the step of delivering apnea therapy includes the step of selectively delivering drug therapy to the patient using the drug pump.

14. (Original) The method of claim 10 for use with a system having an implantable phrenic nerve stimulator and wherein the step of delivering apnea therapy includes the step of delivery of diaphragmatic pacing to the phrenic nerves using the phrenic nerve stimulator.

15. (Currently Amended) The method of claim [[1]] 5 further including the step of generating a warning signal in response to non-obstructive apnea sufficient to alert the patient.

16. (Original) The method of claim 15 wherein the step of generating a warning signal includes one or more of: transmitting a signal to an external alarm device; electrically stimulating selected muscles of the patient to cause the muscles to twitch using an implantable electrical stimulator; or controlling an implantable vibration device to vibrate.

17. (Currently Amended) The method of claim [[1]] 5 further including the step of recording diagnostic information representative of detection of apnea.

18. (Currently Amended) A system for detecting non-obstructive apnea within a patient using implantable medical components, the system comprising:
a blood pressure detector; and
a blood pressure-based non-obstructive apnea detector operative to detect non-obstructive apnea within the patient based on changes in diastolic blood pressure;
wherein the apnea detector tracks changes in diastolic blood pressure from beat to beat, identifies a period of time having a substantially uniform decrease in diastolic blood pressure from beat to beat, and associates non-obstructive apnea with the period of time having a substantially uniform decrease in the diastolic blood pressure from beat to beat.

19. (Currently Amended) A system for detecting and treating non-obstructive apnea within a patient using implantable medical components, the system comprising:

a blood pressure-based non-obstructive apnea detector operative to detect non-obstructive apnea within the patient based on changes in diastolic blood pressure; and
an apnea treatment system operative in response to detection of non-obstructive apnea to deliver therapy;
wherein the apnea detector tracks changes in diastolic blood pressure from beat to beat, identifies a period of time having a substantially uniform decrease in diastolic

blood pressure from beat to beat, and associates non-obstructive apnea with the period of time having a substantially uniform decrease in the diastolic blood pressure from beat to beat.

20. (Original) The system of claim 19 wherein the apnea treatment system includes a diaphragmatic pacing system operative to deliver diaphragmatic pacing.

21. (Original) The system of claim 19 wherein the apnea treatment system includes an overdrive pacing system operative to deliver overdrive pacing to the heart of the patient.

22. (Currently Amended) A system for detecting non-obstructive apnea within a patient using implantable medical components, the system comprising:

means for detecting diastolic blood pressure;

means for tracking changes in diastolic blood pressure;

means for identifying a period of time having a substantially uniform decrease in diastolic blood pressure; and

means for associating non-obstructive apnea with the period of time having the substantially uniform decrease in the diastolic blood pressure.

23. (New) The method of claim 4 wherein the period of time is about ten seconds.

24. (New) The system of claim 18 wherein the apnea detector detecting non-obstructive apnea within the patient based on changes in diastolic blood pressure further comprises:

evaluating BP(n) wherein BP(n) is the diastolic blood pressure of a heartbeat "n" for a plurality of beats;

calculating $\Delta BP(n) = BP(n) - BP(n-1)$ for the plurality of beats;

calculating $\Delta \Delta BP = \Delta BP(n) - \Delta BP(n-1)$ for the plurality of beats; and

identifying a period of time wherein $\Delta\text{BP}(n) < 0$ and $|\Delta\Delta\text{BP}|$ is less than a predetermined rate-based threshold value; and
determining whether the period of time exceeds a predetermined time-based threshold value and, if so, generating a signal indicative of the onset of non-obstructive apnea.

25. (New) The system of claim 18 wherein the predetermined period of time is about 10 seconds.

26. (New) The system of claim 18 wherein the substantially uniform decrease in diastolic pressure from beat to beat comprises a rate of change in diastolic pressure from beat to beat to remain near zero.

27. (New) The system of claim 19 wherein the apnea detector detecting non-obstructive apnea within the patient based on changes in diastolic blood pressure further comprises:

evaluating $\text{BP}(n)$ wherein $\text{BP}(n)$ is the diastolic blood pressure of a heartbeat "n" for a plurality of beats;

calculating $\Delta\text{BP}(n) = \text{BP}(n) - \text{BP}(n-1)$ for the plurality of beats;

calculating $\Delta\Delta\text{BP} = \Delta\text{BP}(n) - \Delta\text{BP}(n-1)$ for the plurality of beats; and

identifying a period of time wherein $\Delta\text{BP}(n) < 0$ and $|\Delta\Delta\text{BP}|$ is less than a predetermined rate-based threshold value; and

determining whether the period of time exceeds a predetermined time-based threshold value and, if so, generating a signal indicative of the onset of non-obstructive apnea.

28. (New) The system of claim 19 wherein the predetermined period of time is about 10 seconds.

29. (New) The system of claim 19 wherein the substantially uniform decrease in diastolic pressure from beat to beat comprises a rate of change in diastolic pressure from beat to beat to remain near zero.

30. (New) The system of claim 22 wherein the means for associating non-obstructive apnea with the period of time having the substantially uniform decrease in the diastolic blood pressure further comprises:

evaluating BP(n) wherein BP(n) is the diastolic blood pressure of a heartbeat "n" for a plurality of beats;

calculating $\Delta\text{BP}(n) = \text{BP}(n) - \text{BP}(n-1)$ for the plurality of beats;

calculating $\Delta\Delta\text{BP} = \Delta\text{BP}(n) - \Delta\text{BP}(n-1)$ for the plurality of beats; and

identifying a period of time wherein $\Delta\text{BP}(n) < 0$ and $|\Delta\Delta\text{BP}|$ is less than a predetermined rate-based threshold value; and

determining whether the period of time exceeds a predetermined time-based threshold value and, if so, generating a signal indicative of the onset of non-obstructive apnea.

31. (New) The system of claim 22 wherein the predetermined period of time is about 10 seconds.

32. (New) The system of claim 22 wherein the substantially uniform decrease in diastolic pressure from beat to beat comprises a rate of change in diastolic pressure from beat to beat to remain near zero.